

ADAMANT TECHNOLOGIES

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Keywords: Diamond electrodes, electrochemistry, electrolysis, water treatment

Abstract

The development of novel and innovative solutions for water treatment is focus of various research initiatives. New systems have to prove efficiency and ecofriendliness as well as their applicability for daily use and series production. CSEM Inc., Swiss Centre for Electronics and Microtechnology, and its latest spin-off company, Adamant Technologies Inc., have developed products that fulfil these conditions and are introducing new technologies for water treatment which apply electrochemical processes instead of chemicals.

In recent years, CSEM has established research activities in the field of environmental technology and developed new methods for water treatment without the use of chemicals. These new developments are based on highly efficient electrolysis technology. In December 2004, “DiaCell[®]” – a diamond electrode based system for water purification.

The majority of currently applied methods for water treatment use considerable quantities of chemicals to produce clean drinking and process water or for treating wastewater. The new water treatment technique DiaCell[®]-System needs just electricity and uses diamond coating technologies. This material is used in the electrolysis process as a self-cleaning electrode which supports the treatment of industrial wastewater by reducing pollutants and by inactivating micro-organisms of fresh water.

The new technique is based on the latest knowledge in electrochemistry, since the chemical reactions take place within the micrometric range of reactive interfaces. Thanks to the corresponding charge carrier interactions on special electrically charged surfaces, the water is split into hydroxyl radicals, with any impurities such as germs and dirt particles being destroyed. A further advantage of this technique is that the electrodes are implemented in a compact modular system, the DiaCell[®], which demands little space and low energy.

The DiaCell[®] concept was initially developed for water disinfection i.e. in swimming pools and has later been proven to be suitable for many other applications. Legionella inactivation is a further potential for the technology, also, the systems are able to destroy organic pollutants, even non-biodegradable or so called persistent organic pollutants (POP's). This effect is mainly used in the treatment of industrial effluents. Furthermore, the DiaCell[®] systems allow the oxidation of inorganic pollutants such as cyanides and hypophosphites which are relevant for the regeneration or recycling of plating baths.